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Non-Identifiable Coding for Longitudinal Research

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Background and Aims

Traditional methods of anonymous reporting garners vital data about otherwise sensitive information, such as risky drinking behavior. However, anonymous reporting does not allow longitudinal tracking. The use of self-generated identification codes (SGIC) may be useful in addressing this limitation. Researchers could use SGIC with military populations to infer the changes of individual alcohol use pre- and post-deployment without participants limiting their disclosures due to fear of self-incrimination.

However, many studies have found poor match rates between pre-test and posttest SGIC due to poor respondent reliability across time (for review see Schnell et al., 2010). The current study refined SGIC prompts and applied a statistically guided matching algorithm (Schnell et al., 2010; e.g., Levenshtein distance function method). The number of questions and SGIC content were selected based on stability over time and ability to discriminate between participants.

Methods

Active duty Airmen* (n=363) in technical school training were solicited to participate in the study during alcohol informational briefs. Airmen were informed they would be designing a SGIC to help gather sensitive healthcare information (e.g. drinking behaviors) anonymously over time. Upon consent, Airmen were given the non-identifiable coding questions and the AUDIT-C screener.

Following a 45-minute alcohol intervention, Airmen were re-administered the non-identifiable coding questions, prompting recollections of their original SGIC. Airmen were also given questions regarding their beliefs about the anonymity of responses. Pre- and post-intervention codes were then matched using the Levenshtein distance function method.

Only 309 participants completed pretests, therefore analyses were conducted in an effort to match these cases to post-tests.

Levenshtein Model

- Attempts to match pre- and post-intervention codes using the least number of operations changes between strings of data.
- Operation changes include: Insertion, Deletion, and Substitution.
- Example:

Original	Recreation 1	Recreation 2
B	B	B
6		
R	R	R
8	8	

- Recreation 1 would be matched with the original string due to a lower number of operation changes (1 change) compared to Recreation 2 (2 changes).

Questions used to generate code

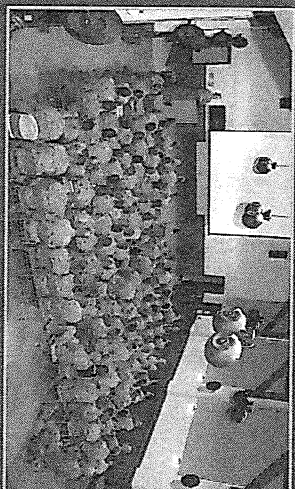
- First 2 letters of your mother's maiden name
- The 2 letter abbreviation for the state in which you were born
- First 2 letters of the name of the school where you began 9th grade
- Day of the month were you born on
- Number of older siblings do you have, alive and deceased
- Natural hair color
- First 2 letters of the mascot associated with your favorite professional sports team
- First 2 letters of the make of your first car
- Last number of your first home address
- Number of siblings your mother has, alive and deceased

Results

- Using the Levenshtein method, 98.7% match rate was achieved (up to 4 changes).
- There was a 66% exact match rate (0 changes).
- Airmen were highly confident their responses were anonymous.
- Airman reported low worry about career impact when disclosing drinking rates during the study.

Discussion

- Matching algorithms like the Levenshtein distance function method are a viable method for short-term longitudinal pre-post test design research.
- Using matching algorithms with non-identifiable coding may serve to prompt more honesty from active duty service members when attempting to gather sensitive healthcare related data.
- Future study within the military context should attempt these methods in long-term longitudinal studies.



References

Schnell, R., Baehner, T., & Reiter, J. (2010). Improving the use of self-generated identification codes. *Evaluation Review*, 34(5), 391-418.

*Airmen did not receive compensation for participating.

Disclaimer

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